Outcome of patients with spontaneous pneumothorax admitted in Abbasia Chest Hospital

Emad E. Korraa[a], Ashraf M. Madkour[a], Amr M. Shoukri[a], Sameh E. Ahmed[b]

Introduction Spontaneous pneumothorax remains a significant global problem. It can present either in a primary form occurring in healthy individuals or in a secondary form essentially associated with an underlying lung disease. The primary goals of therapy are to remove air from the pleural space and to prevent recurrence. The choice of a therapeutic intervention is multifactorial.

Aim of the work The aim of this study was to study the clinical course and outcome of patients with spontaneous pneumothorax in Abbasia Chest Hospital.

Patients and methods This prospective study was conducted on 100 patients with spontaneous pneumothorax admitted in Abbasia Chest Hospital in Cairo, Egypt. Patients were divided into two main groups: group I, the primary spontaneous pneumothorax (PSP) group, and group II, the secondary spontaneous pneumothorax (SSP) group. Chest tube drainage was performed for patients with large PSP, small PSP increasing in size or associated with symptoms, and all patients with SSP. Patients were subjected to thoracic surgical interventions, whenever indicated.

Results We included 100 patients with spontaneous pneumothorax: group I (PSP) consisted of 66 patients, and group II (SSP) consisted of 34 patients. Of them, 92% were male and 8% were female. Comparison between the two groups demonstrated that PSP occurs predominantly in male population, especially younger and taller individuals, whereas there was no significant difference in weight or BMI between the two groups. An overall 77% of all studied patients were smokers. PSP patients had a shorter hospital stay compared with SSP patients. The causes of SSP were chronic obstructive pulmonary disease (64.7%), bronchial asthma (2.9%), interstitial lung diseases (14.7%), tuberculosis (17.6%), and bronchiectasis (2.9%). All patients were subjected to chest tube drainage. Complications were found in 6% of patients in group I and in 26.4% of patients in group II. Different complications were noticed in the form of surgical emphysema, hydropneumothorax, persistent air leak, and pleural infection. In group I, only one patient (1.5%) required further interventions, whereas in group II 11.7% needed surgical interventions. Mortality occurred in three patients (8.8%) in group II. There was no evidence that any mortality was directly related to pneumothorax or its management.

Conclusion PSP was more frequent compared with SSP in our study, with a higher incidence in younger and taller male population. Smoking is an important risk factor for spontaneous pneumothorax, and the most common lung disease found in our study to be associated with SSP was chronic obstructive pulmonary disease. We conclude that PSP carries a lesser risk for complications and better outcome compared with SSP. The risk for mortality or major complications from spontaneous pneumothorax in general was negligible in our study.

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[a]Department of Chest Diseases, Faculty of Medicine, Ain Shams University, Cairo, [b]Abbasia Chest Hospital, Cairo, Egypt

Correspondence to Amr Mounir Shoukri, MD, 43 El-Mahrouky Street, Heliopolis, Cairo 11341, Egypt Tel: +20 100 660 1870; e-mail: amr_shoukri@hotmail.com

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Introduction

Spontaneous pneumothorax is the presence of air inside the pleural cavity; it is either primary or secondary. Secondary spontaneous pneumothorax (SSP) denotes an associated lung disease. The incidence of primary spontaneous pneumothorax (PSP) in the population is 18–28 per 100 000 in the male population and 1.2–6.0 per 100 000 in the female population, whereas the incidence of SSP is 6.3 per 100 000 in the male population and 2.0 per 100 000 in the female population [1].

The accurate pathophysiology of PSP is still not clearly understood. The identified bullae at the level of the visceral pleura are not always the source of air leakage. Smoking is an important risk factor for PSP, and smokers have a greater lifetime risk of developing pneumothorax compared with nonsmokers [2].

SSP can be provoked by many pulmonary diseases such as chronic obstructive pulmonary disease (COPD), cystic fibrosis, tuberculosis, sarcoidosis, different connective tissue diseases, and malignancies [3].

The clinical presentation of PSP is usually chest pain without dyspnea, except if it is tension pneumothorax, whereas in SSP dyspnea and respiratory insufficiency are always present and the condition can be life-threatening and requires urgent intervention [4].

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The definite diagnosis relies on radiological assessment that is usually needed to evaluate the degree of pneumothorax [5].

The aims of management are to remove the air from the pleural space and to prevent the recurrence of pneumothorax. The best treatment is controversial, and the decision should be taken individually according to the type and degree of pneumothorax, as well as the clinical presentation of the patient. Treatment can be in the form of simple observation, air drainage, and other procedures to prevent recurrence such as pleurodesis with or without thoracoscopy [6]. Pleurodesis is indicated after the first recurrence in PSP, and after the first episode in SSP, it creates symphysis between visceral and parietal pleural surfaces, hence preventing recurrence of pneumothorax [6].

Aim of the study

The aim of this study was to study the clinical course and outcome of patients with spontaneous pneumothorax in Abbasia Chest Hospital.

Patients and methods

This prospective study included 100 patients with spontaneous pneumothorax admitted in Abbasia Chest Hospital during the period between August 2013 and August 2014. After ethical committee approval for the study, written informed consent was obtained from all patients.

Inclusion criteria

A total of 100 consecutive patients admitted in Abbasia Chest Hospital with pneumothorax were included in the study.

Exclusion criteria

Any patient who refused to participate in the study, or refused to sign the informed consent, and patients with iatrogenic or traumatic pneumothorax were excluded from the study.

All patients were subjected to the following: full history taking with collection of all data concerning personal history, demographics, BMI, occupational history, history of other illnesses, history of chest diseases, and special habits; complete clinical examination; and radiological assessment, including chest radiography posteroanterior view and computed tomography of the chest, whenever required. Chest tube drainage was performed for patients with large PSP, small PSP increasing in size or associated with symptoms, and all patients with SSP. Patients were subjected to thoracic surgical interventions, whenever indicated. Follow-up was carried out clinically and radiologically with serial chest radiographs until discharge, with collection of data concerning clinical course, detailed management procedures, duration of hospital stay, outcome, and complications. All collected data were statistically analyzed.

Statistical analysis

Quantitative data were represented as mean (±SD), and qualitative data as number and percentage. Data entry and statistical analysis were performed using SPSS software (version 15; SPSS Inc., Chicago, Illinois, USA).

Results

The present work studied the clinical course, primary outcome (mortality), and secondary outcomes (complications and length of hospital stay) of 100 patients with spontaneous pneumothorax admitted in Abbasia Chest Hospital, Cairo, Egypt, during a period of 1 year. The patients were divided into two groups: group I (PSP), and group II (SSP). Group I (PSP) consisted of 66 (66%) patients, and group II (SSP) consisted of 34 (34%) patients. There were 92 (92%) male and eight (8%) female patients. In group I, there were 64 (97%) male and two (3%) female patients, and in group II there were 28 (82.4%) male and six (17.6%) female patients. Table 1 shows the descriptive data of the sex of the studied patients. The mean age in group I was 30±9.98 years, versus 48.6±15.74 in group II. Comparison between the two groups shows that PSP occurs in younger and taller individuals, whereas there was no significant difference in weight or BMI between the two groups. PSP patients had a shorter duration of hospital stay. Cigarette smoking was present in 77% of all patients, 48 patients in group I (72.7%) and 29 patients in group II (85.2%), and the smoking index was higher in SSP. Table 2 shows descriptive and analytical data of the demographics and the duration of hospital stay of the studied patients.

Table 1 Types of pneumothorax and sex of the studied patients

Type of pneumothorax	Sex [*n* (%)]		Total [*n* (%)]
	Male	Female	
Group I (primary spontaneous pneumothorax)	64 (97)	2 (3)	66 (100)
Group II (secondary spontaneous pneumothorax)	28 (82.4)	6 (17.6)	34 (100)
Total	92 (92)	8 (8)	100 (100)

Table 2 Descriptive and analytical data of the demographics and the duration of hospital stay of the studied patients

Parameters	Group I (mean±SD)	Group II (mean±SD)	*P* value	Significance
Age	30.07±9.98	48.6±15.74	<0.01	Significant
Weight	63.56±12.8	65±15.47	0.60	Nonsignificant
Height	173.27±10	168.7±9.74	0.034	Significant
BMI	21±4.5	22.8±5.4	0.1	Nonsignificant
Smoking index	16.47±10.3	38±24.75	<0.01	Significant
Duration of hospital stay	6.3±6	13.3±10.5	<0.01	Significant

The causes of SSP were COPD (64.7%), bronchial asthma (2.9%), interstitial lung diseases (14.7%), tuberculosis (17.6%), and bronchiectasis (2.9%).

Right-sided pneumothorax was present in 56% of patients in group I and 55% of patients in group II. The size of pneumothorax was greater than 2 cm from the lateral chest wall in chest radiography in 95.5% of patients in group I and in 100% of patients in group II. Table 3 shows the descriptive data of the site of pneumothorax, and Table 4 shows the descriptive data of the size of pneumothorax in the studied patients.

All patients were subjected to chest tube drainage. Complications were found in 6% of patients in group I and in 26.4% of patients in group II. There was a significant statistical difference between the two groups as regards the incidence of complications. Table 5 shows descriptive data for complications recorded in the studied patients. Complications were in the form of surgical emphysema, hydropneumothorax, air leak, and pleural infection. Table 6 shows the pattern of different complications recorded.

In group I, only one patient (1.5%) required further interventions in the form of fistula repair, whereas in group II four patients (11.7%) underwent surgical interventions (Table 7). Surgical interventions performed in group II were decortication in one patient and fistula repair for three patients.

Mortality occurred in three patients (8.8%) in group II, whereas there was no mortality in group I. There was no evidence that any mortality was directly related to pneumothorax or its management.

Table 3 Descriptive data of the site of pneumothorax in the studied patients

Type of pneumothorax	Site of pneumothorax		Total
	Left	Right	
Group I			
Count	29	37	66
Percentage	43.9%	56.1%	100.0%
Group II			
Count	16	18	34
Percentage	47.1%	52.9%	100.0%
Group I+group II			
Count	45	55	100
Percentage	45.0%	55.0%	100.0%

Table 4 Descriptive data of the size of pneumothorax in the studied patients

Type of pneumothorax	Size of pneumothorax		Total
	<2 cm	>2 cm	
Group I			
Count	3	63	66
Percentage	4.5%	95.5%	100.0%
Group II			
Count	0	34	34
Percentage	0%	100%	100.0%
Group I+group II			
Count	3	97	100
Percentage	3%	97%	100.0%

Table 5 Descriptive data of the complications in the studied patients

Type of pneumothorax	Complications		Total
	Yes	No	
Group I			
Count	4	62	66
Percentage	6%	94%	100.0%
Group II			
Count	9	25	34
Percentage	26.4%	73.6%	100.0%
Group I+group II			
Count	13	55	100
Percentage	13%	55.0%	100.0%

Table 6 Descriptive data of the types of complications in the studied patients

Types of complications	Type of pneumothorax	
	Group I [*n* (%)]	Group II [*n* (%)]
Surgical emphysema	3 (4.5)	4 (11.7)
Hydropneumothorax	0 (0)	2 (5.8)
Air leak	1 (1.5)	4 (11.7)
Pleural infection	0 (0)	1 (2.9)

Discussion

Pneumothorax is defined as the accumulation of air in the pleural space. A distinction should be made between PSP and SSP, as well as between iatrogenic pneumothorax and traumatic pneumothorax. PSP occurs mainly in otherwise healthy people without any clinical sign of lung disease. In contrast, SSP

Table 7 Descriptive data of the surgical interventions in the studied patients

Type of pneumothorax	Surgical intervention		Total
	Yes	No	
Group I			
Count	1	65	66
Percentage	1.5%	98.5%	100.0%
Group II			
Count	4	30	34
Percentage	11.7%	88.3%	100.0%
Group I+group II			
Count	5	95	100
Percentage	5%	95%	100.0%

mostly occurs in patients with diagnosed and clinically manifested lung disease [2]. Drainage of the air from the pleural space and prevention of recurrence are the primary goals of management. Although simple needle aspiration may be applied as a first-line of treatment, it usually shows little advantage for most of the patients. All patients with symptomatic pneumothorax should be treated with immediate intercostal tube drainage [3]. Surgical treatment for pneumothorax may be required either for the resection of blebs or the suture of apical perforations to treat the underlying defect, or to create a pleural symphysis to prevent recurrence. Video-assisted thoracic surgery is usually the preferred surgical procedure [3].

In the present work, an effort was made to study the clinical course, primary outcome (mortality), and secondary outcomes (complications and length of hospital stay) of patients with spontaneous pneumothorax admitted in Abbasia Chest Hospital during the period of 1 year.

A total of 100 patients with spontaneous pneumothorax were included and divided into two groups, group I (PSP) and group II (SSP). PSP was found to be more common compared with SSP, representing 66% of cases. It is more common in third and fourth decades and predominant in tall male population. SSP represented 34% of cases, with COPD as the main cause, associated with 64.7% of the cases. Most of the patients in both groups were smokers.

Our study demonstrated a population with characteristics similar to those reported in other international studies. Patients with PSP were mostly young male population; the mean age was higher in SSP. Lee *et al.* [7] studied 77 consecutive patients younger than 18 years and admitted with PSP between 1 January 1999 and 30 September 2007. They were significantly taller and thinner than the population mean percentile. Moreover, Chew *et al.* [8] studied 116 patients with PSP treated at an Australian tertiary hospital. Male population accounted for 75% of patients, and the median age at presentation was 37 years.

The results of our study are also in agreement with the results reported by Sousaa *et al.* [9], in which PSP represented 63.6% of cases of spontaneous pneumothorax with male predominance (76.2%), with a mean age of 30 ±15 years. SSP represented 36.4% of cases with male predominance (83.3%). The most common cause of SSP was pulmonary tuberculosis and only 6% had associated COPD, which is different from our results, in which 64.7% had COPD as the main pulmonary disease associated with SSP.

Our study shows that pneumothorax affects both the left and the right lung with no significant difference. In PSP patients, 56% were right sided and 44% were left sided, whereas in SSP patients 53% were right sided and 47% were left sided.

The size of pneumothorax plays an important role in the management plan according to different guidelines. In our study, the size of pneumothorax in group II (SSP) was greater than 2 cm in all patients, whereas three patients (4.5%) in group I (PSP) had a size less than 2 cm; these three patients were monitored for few hours, and then follow-up radiological assessment showed an increase in the size of pneumothorax, and hence a chest tube was inserted.

Duration of hospital stay was 6.3±6 days for group I, and 13.3±10.5 days for group II. These results are in agreement with the results reported by Andrivet *et al.* [10], who studied 96 PSP cases, and the mean duration of hospital stay was 7±4.6 days. Moreover, Wojsyk-Banaszak *et al.* [11] conducted a retrospective review of medical records of all patients with pneumothorax during 11 years. There were 52% of PSP, 37% of SSP, and 11% of pneumothorax patients due to nonpenetrating trauma. An overall 59% of patients were male. The mean duration of hospital stay was 7.2±1.4 days for PSP and 5.7±6.4 days for SSP patients, which is much shorter than that reported in our results.

Lee *et al.* [7] also reported a mean duration of hospital stay of 6.9±3.0 days for children with PSP.

The present study demonstrates that SSP (group II) patients significantly developed more complications compared with PSP. The rate of complications was 26.4% in group II (SSP), versus 6% in group I (PSP). Other studies, similar to that of Ferraro *et al.* [12], found no significant difference in complications between PSP and SSP.

The most common complication recorded in the present study was surgical emphysema; it occurred in three patients (4.5%) in group I and in four patients (11.7%) in group II. The second more common complication was air leak, occurring in four patients in group II (11.7%) and in one patient in group I (1.5%). Moreover, two patients (5.8%) in group II had developed hydropneumothorax and one patient (2.9%) had pleural infection after 6 days of chest tube drainage. All cases of surgical emphysema in our study were due to chest drain, and all cases were self-limiting.

These results are in accordance with the results reported by Jones *et al.* [13], in which 167 pneumothorax patients undergoing chest tube drainage within a 12-month period were evaluated retrospectively; surgical emphysema was the most common complication, and it was associated with an increased time of hospital stay.

Our study shows that the proportion of SSP cases that needed to be subjected to surgical interventions was higher than that of PSP cases; 1.5% of PSP versus 11.7% of SSP patients underwent thoracic surgeries in the form of fistula repair, bullectomy, and decortication.

Our results differ from the results of other authors [14], who reviewed the records of 130 episodes of spontaneous pneumothorax in 115 patients over a 2-year period to determine clinical course and outcome, particularly with respect to duration of air leak. Eighty-one episodes (62%) occurred in patients with underlying lung disease (secondary pneumothorax). Initial management consisted of chest-tube drainage in 104 episodes (80%) occurring in 90 patients. The overall incidence of bronchopleural fistula was 34.6%, which is much more than that reported in our results and may be due to the longer period of the study or the higher percentage of patients with SSP. The same study reported that only five patients underwent surgery, which is in accordance with our results. There were no major complications or mortality.

No mortality could be possibly attributed to pneumothorax or its consequences in the present study, whereas the incidence of secondary mortality due to other medical causes was 3%.

Conclusion

PSP is more frequent compared with SSP in our studied patients; the incidence is higher in younger and taller male population. Smoking is an important risk factor for spontaneous pneumothorax, and the most common lung disease found in our study to be associated with SSP was COPD. We conclude that PSP carries a lesser risk for complications and better outcome compared with SSP. The risk for mortality or major complications from spontaneous pneumothorax in general was negligible in our study.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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Erratum: Telomere length in chronic obstructive pulmonary disease

In the article titled, "Telomere length in chronic obstructive pulmonary disease" published in pages 20-26, Issue 1, Vol. 9 of Egyptian Journal of Bronchology[1], the author names are incorrectly written as "Galal-Eldin M. Magd, Ahmad S. Entesar, Hafez R. Manal, Sobh M. Eman, Alrayes H. Mona" instead of "Magd M. Galal-Eldin, Entesar S. Ahmad, Manal R. Hafez, Eman S.M. Sobh, Mona H. Alrayes".

The "How to cite this article" section information is written incorrectly as "Magd GEM, Entesar AS, Manal HR, Eman SM, Mona AH. Telomere length in chronic obstructive pulmonary disease. Egypt J Bronchol 2015;9:20-6" Instead of "Galal-Eldin MM, Ahmad ES, Hafez MR, Sobh ESM, Alrayes MH. Telomere length in chronic obstructive pulmonary disease. Egypt J Bronchol 2015;9:20-6".

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1 Magd GEM, Entesar AS, Manal HR, Eman SM, Mona AH. Telomere length in chronic obstructive pulmonary disease. *Egypt J Bronchol* 2015; **9**20–26.

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